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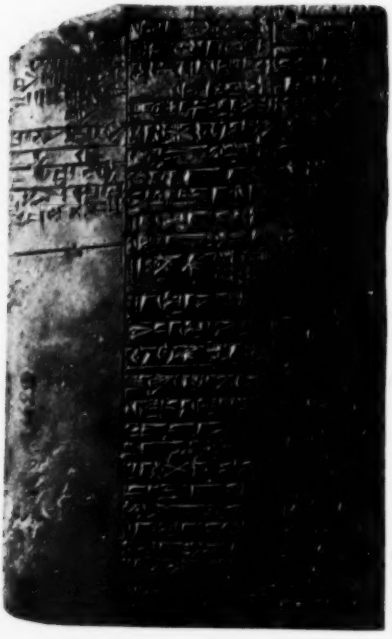

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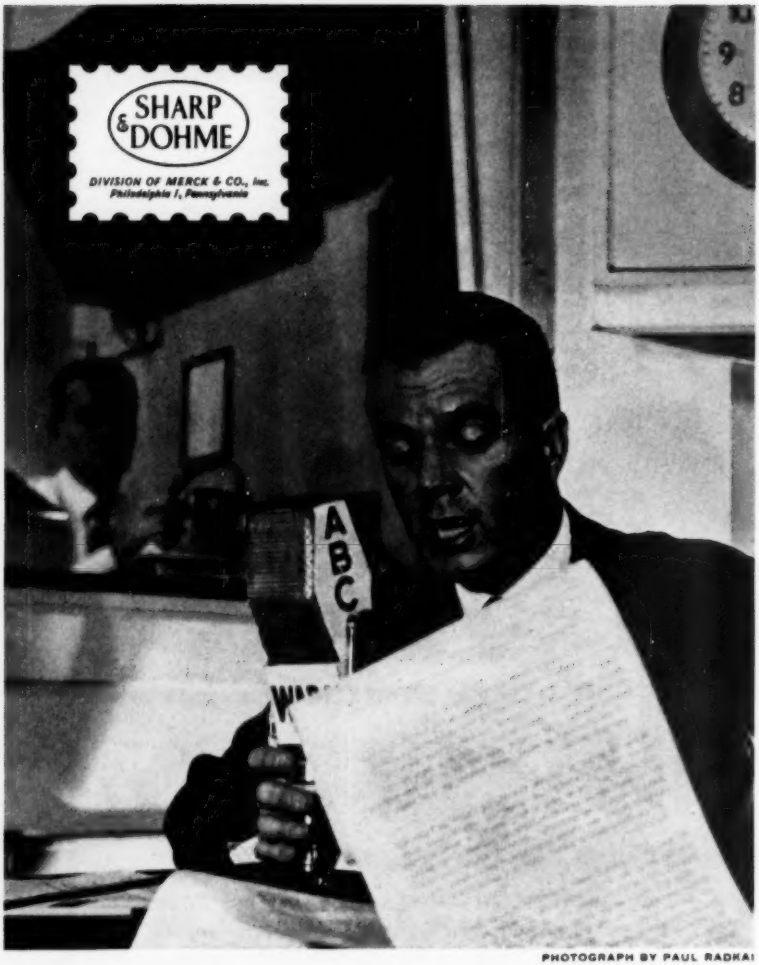

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Since 1825

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EDITORIAL

THE ANCIENT PAST AND THE FUTURE

IN this issue is a most interesting article on the first pharmacopeia in man's recorded history. The remedies used at this early date are of course no match for our highly potent drugs of today. We should not, however, be too smug about our present state of affairs. In our own *National Formulary,* now official, there are many drugs which are either known to be inert or otherwise discredited. One suffering from some anxiety neurosis, for example, would be just as likely to be cured by the dried turtle shell of the ancient Sumerians as by Hypophosphites Syrup N. F. IX. Even many of the drugs in which we now place great confidence will in time be discredited and replaced with superior products. One can reflect on the events of the past two decades and think of innumerable instances wherein a drug, long regarded as a specific, now has been relegated to that limbo where resides snake skin, unicorn and the like.

It is hard for us to believe that a century hence our present concepts of therapy will be altered beyond recognition, but this seems a certainty. There is surely no reason to believe that we in the late twentieth century have achieved the acme of perfection in the control of disease. The truth is that there is good reason to believe that within the next century all diseases will be subject to control and many will be eradicated entirely; diseases such as syphilis, gonorrhea, poliomyelitis and malaria will then occupy only the attention of medical historians.

While in the present century we have made the conquest of disease our major concern, the next century may see this problem pretty well solved. Its solution has and is causing great and new problems to arise. These will dwarf into insignificance our health problems of this century. As disease is conquered the world over, longevity will be greatly increased and population growth will sky-rocket. The problem of feeding this growing population will then become society's greatest concern. Improved technology will help to a large extent but it is likely to fail to keep abreast of population growth and food requirements. The great social unrest now evident

in Asia and Africa will grow to even greater proportions, for these people will insist on a more reasonable standard of living and more equitable treatment. As their educational and technological advancement progresses they will, furthermore, be in a position to obtain these things with or without the consent or help of western civilization. That we are slow in recognizing this fact is at the crux of the present world turmoil.

World government will become a reality, for the only alternative will be the total destruction of civilization by the miracle weapons which have been developed concurrently with miracle drugs. Already we can see signs that even the most belligerent of peoples hesitate to precipitate the terrible holocaust. Communism will become more like capitalism and vice versa; this trend is also evident. Eventually, if we can keep from each other's throat, our differences will be insignificant. Rugged individualism and absolute capitalism are luxuries that only certain countries can enjoy. In time they, too, will find this system less workable as population pressure and concomitant economic pressure increases.

As a part of world government a truly international pharmacopeia will become a reality. Present effort in this direction is made difficult by the insistence on national prerogatives. While this today can be justified, to the future historian (circa 2100 A. D.) this and other symptoms of nationalism will appear like the dying spasms of an old system as it contemplates the awful impact of the new.

Nothing is more certain than change and nothing more painful. Our efforts to resist it will appear as ludicrous to some future generation as some of the unsuccessful attempts made by our early forbears now appear to us. While each of us must perforce live during that short span of years given to us we should not fail to contemplate the vastness of the universe, the endlessness of time, and the inevitability of change.

L. F. Tice

FIRST PHARMACOPEIA IN MAN'S RECORDED HISTORY

By Samuel Noah Kramer *

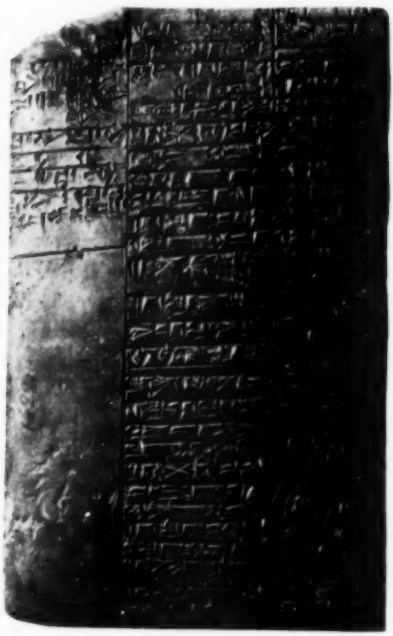
DURING the third and second millenia B. C., Sumer, the land later known as Babylonia, and corresponding roughly to the lower half of modern Iraq, was the seat of what was probably the predominant civilization in the ancient Near East. It was the scene of two of the most significant events in the history of civilization: the "urban revolution" which transformed barbaric villages to highly cultured cities, and the invention of writing which provided a new and most effective tool of communication. As a consequence, not a little of the manner and content of our present way of life finds its prototype in the Sumerian civilization. Whether it be monumental architecture or the varied products of the arts and crafts, whether it be in the field of economics and politics, law or literature, religion or ethics, at least some aspects will find an early counterpart in the delta land of the Tigris and Euphrates rivers. It is not without reason that Sumer is gradually becoming known to the modern historian as the "cradle of civilization."

Throughout the entire history of Sumer, its spiritual and cultural center was the city called Nippur, situated not more than a hundred miles south of modern Baghdad. Its temple Ekur, "the mountain-house," was the seat of worship of the great air-god, Enlil, long the leading deity of the Sumerian pantheon. Its schools were the most famous and most productive in Sumer; its scholars and scribes, its "scientists" and creative writers, were no doubt among the most distinguished in the land. Here in the ruins of Nippur, a University of Pennsylvania expedition conducted excavations some fifty years ago. It uncovered thousands of clay tablets written in the cuneiform script and largely in the Sumerian language. Among them are historical inscriptions, business and legal documents of all kinds, linguistic compilations showing a considerable, if superficial, knowledge of what we now term mathematics, botany, zoology, mineralogy, and lexicography.

* Clark Research Professor of Assyriology and Curator of the Tablet Collections, University of Pennsylvania.

One of the most interesting groups of inscriptions consists of a collection of creative writings, clay documents inscribed with Sumerian myths and epic tales, hymns and lamentations, proverbs and fables. Most of them were actually written down about 1700 B. C.; many of them may have been composed centuries earlier. These clay "books" contain, therefore, what is by all odds the oldest literature known to man; they antedate the writing of the Hebrew Bible and the Greek Iliad and Odyssey by more than a thousand years.

This article illustrates one type of inscriptional discovery made at Nippur by describing the contents of just one of the thousands of tablets excavated there, a rather important piece from the point of view of the history of science, since it is inscribed with the oldest medical text in man's recorded history. This particular piece, three and three-quarters by six and one-quarter inches in size, though excavated



Reverse of Tablet Inscribed With the First Pharmacopeia Known Thus Far in the History of Civilization.

more than fifty years ago, was not adequately translated until the summer of last year. To judge from the script, it was written some time toward the end of the third millenium B. C. by an anonymous Sumerian physician who for some unknown reason had decided to collect and record a number of what were probably his more valuable prescriptions. Because of the technical nature of its contents, I asked Martin Levey, a Penn State chemist who specializes in the history of science, to assist me in the translation, and the clarification of the pharmacological, and chemical processes involved are practically all due to Levey's efforts.

The Sumerian doctor, we learn from this ancient document, went, not unlike his modern counterpart, to botanical, zoological, and mineralogical sources for his materia medica. His favorite minerals were sodium chloride and potassium nitrate. From the animal kingdom he utilized milk, snake-skin, and turtle-shell. But most of his medicinals came from the botanical world, from plants such as cassia, myrtle, asafetida, alkali, and thyme and from trees such as the willow, pear, fir, fig, and date. These samples were prepared from the seed, root, branch, bark, or gum, and must have been stored, as today, in either solid or powdered form.

The remedies prescribed by our nameless practitioner were both salves and filtrates to be applied externally, as well as liquids to be taken internally. In the case of the salves the instructions were usually to pulverize one or more simples, to infuse the powder with "kushumma" wine, and then spread common tree oil as well as cedar oil over the mixture. In one instance, however, in which pulverized river clay was one of the simples, the powder is kneaded in water and honey, and "sea" oil instead of tree oil is spread.

The filtrate prescriptions were more complicated and were followed by directions for treatment. Three of the prescriptions, where the text is reasonably certain, make use of the process of decoction. The sought for principles are extracted by boiling in water, and alkali and salts are added, probably to obtain a greater yield of the total extract. To separate the organic materials from the aqueous extract of the decoction, filtration was no doubt practiced, although this is not stated explicitly in any of the prescriptions. The ailing organ was then treated with the filtrate either by sprinkling or washing. Following this, oil was rubbed on it, and then one or more additional simples were added.

In case of the remedies which were to be taken internally, beer was usually the vehicle which made it palatable to the patient, that is, the several simples were ground to a powder and dissolved in beer for the sick man to drink. In one case, however, where milk as well as beer seems to have been used for infusion, an unidentified "river(?)" oil was the vehicle.

In one respect our ancient text is most disappointing. It fails to name the diseases for which the remedies were intended, and so we are unable to check their therapeutic value. It was certainly not very high since the Sumerian physician made little if any use of experiment and verification. The selection of many of the drugs reflected no doubt the long-standing confidence of the ancients in the odoriferous principles of botanical elements. Some of the prescriptions, however, were not without their positive points. For example, the formation of a detergent was of some value. Furthermore, such substances as salt and saltpeter were highly effective as antiseptics and astringents.

Our Sumerian prescriptions suffer from at least one other obvious omission: they fail to specify the quantities to be used in compounding the simples, as well as the dosage and application frequency of the medicine. It is not altogether impossible that this is the result of "professional jealousy," and that our ancient physician purposely concealed the quantitative details in order to protect his secrets from the non-medical fraternity or perhaps even from his colleagues. Tempting as it is, however, this explanation is rather unlikely. More probably the quantitative details just did not loom important to our Sumerian prescription writer, since, practically speaking, they could be figured out more or less empirically in the course of actual preparation and use of the remedies.

In any case, it is interesting to note the Sumerian physician who wrote our tablet did not resort to magic spells and incantations; not one god or demon is mentioned anywhere throughout the text. This is not to say that the use of charms and exorcisms to cure the sick was unknown in Sumer in the third millennium B. C.; there is good indication that quite the contrary is true. But for some reason or other, the physician who wrote this particular medical text, the oldest as yet uncovered in the history of medicine, excluded from it all mystical and irrational elements.

To illustrate the style and flavor of our ancient physician's attempt at prescription writing, here is the literal translation of three of the better preserved prescriptions as far as we understand them today.

1. Pulverize . . . (and) river clay: knead it with water (and) honey: let "sea"-oil and hot (?) cedar oil be spread over it.

2. Pulverize (bark of) the pear (?) tree and the "moon"-plant (perhaps a plant of genue Menispermum): infuse it (the powder) with *kushumma*-wine; let tree-oil and hot (?) cedar oil be spread over it.

3. Apportion (?) . . . turtle-shell, "horned" alkali (Salicornia fruticosa), salt, cassia; knead them together with powdered asafetida; wash them in high quality beer (and) boiling water; sprinkle all its (the mixture's) water, its sprinkling (fluid) upon it (presumably the ailing organ); rub tree-oil over it; let pulverized fir (?) be added.

APPENDIX

The Origin and Development of the Sumerian System of Writing

The cuneiform system of writing was probably originated by the Sumerians. The oldest inscriptions unearthed to date—over one thousand tablets and fragments from about 3000 B. C.—are in all likelihood written in the Sumerian language. But whether or not it was the Sumerians who invented the script, it was certainly they who in the course of the third millenium B. C. fashioned it into an effective writing tool. Its practical value was gradually recognized by the surrounding peoples, who borrowed it from the Sumerians and adapted it to their own languages. By the second millenium B. C. it was current all over the Near East.

The cuneiform script began as pictographic writing; each sign was a picture of one or more concrete objects and represented a word whose meaning was identical with, or closely related to, the object pictured. The defects of a system of this type are obvious; the complicated form of the signs and the huge number of signs required,

ORIGIN AND DEVELOPMENT OF THE SUMERIAN SYSTEM OF WRITING.

THE WRITING ON THE PHARMACOPEIA TABLET IS COMPARABLE TO THAT IN COLUMNS V AND VI.

render it too unwieldy for practical use. The Sumerian scribes overcame the first difficulty by gradually simplifying and conventionalizing the form of the signs until their pictographic original was no longer apparent. As for the second difficulty, they reduced the number of signs and kept it within effective limits by resorting to various helpful devices. The most significant of these consisted of substituting phonetic for ideographic values. The accompanying table was especially prepared to illustrate this two-fold development in the course of the centuries. Thus proceeding from top to bottom:

No. 1 is the picture of a star; it represents primarily the Sumerian word *an,* "heaven." The very same sign, however, is used to represent the word *dingir,* "god."

No. 2 represents the word *ki,* "earth." Obviously it is intended to be a picture of the earth, although the interpretation of the sign is still uncertain.

No. 3 is probably a more or less stylized picture of the upper part of a man's body; it represents the word *lu,* "man."

No. 4 is a picture of the pudenda; it represents the word *sal,* "pudenda." The same sign is used to represent the word *munus,* "woman."

No. 5 is the picture of a mountain; it represents the word *kur,* whose primary meaning is "mountain".

No. 6 illustrates the ingenious device developed early by the inventors of the Sumerian system of writing, whereby they were enabled to represent pictorially words for which the ordinary pictographic representation entailed a certain amount of difficulty. As the reader will note, the sign for the word *geme,* "slave-girl," is actually a combination of two signs, that for *munus,* "woman," and that for *kur,* "mountain"; that is, of signs 4 and 5 on our table. Literally, therefore, this compound sign expresses the idea "mountain-woman." But since the Sumerians obtained their slave-girls largely from the mountainous regions about them, this compound sign adequately represented the Sumerian word for "slave-girl," *geme.*

No. 7 is the picture of a head; it represents the Sumerian word *sag,* "head."

No. 8 is also the picture of a head; the vertical strokes, however, underline the particular part of the head which is intended, that is, the mouth. The sign, therefore, represents the Sumerian word *ka*, "mouth." The same sign naturally enough represents the word *dug*, "to speak."

No. 9 is probably the picture of a bowl used primarily as a food-container; it represents the word *ninda*, "food."

No. 10 is actually a compound sign consisting of the signs for mouth and food (Nos. 8 and 9 on our table); it represents the word *ku*, "to eat."

No. 11 is a picture of a water stream; it represents the word *a*, "water." This sign furnishes an excellent illustration of the process by which the Sumerian script gradually lost its unwieldy pictographic character and became a phonetic system of writing. As just said, the sign No. 11 was used primarily to represent the Sumerian word *a*, "water." However, the Sumerians had another word *a* which was identical in pronunciation with the word *a*, "water," but which had the entirely different meaning "in." Now this word "in" is a word denoting relationship and stands for a concept which is very difficult to express pictographically. To the originators of the Sumerian script then came the ingenious idea that instead of trying to invent a necessarily highly complicated picture-sign to represent the word "in," they could use the sign for *a*, "water," since both words sounded exactly alike. In other words, the early Sumerian scribes came to realize that a sign originally belonging to a given word could be used for another word with an altogether unrelated meaning, if the *sound* of the two words were identical. With the gradual spreading of this practice, the Sumerian script lost its pictographic character and tended more and more to become a purely phonetic script.

No. 12 is a combination of the signs for "mouth" and "water" (Nos. 8 and 11); it represents the word *nag*, "to drink."

No. 13 is a picture of the lower part of the leg and foot in a walking position; it represents the word *du*, "to go," and also the word *gub*, "to stand."

No. 14 is a picture of a bird; it represents the word *mushen*, "bird."

No. 15 is a picture of a fish; it represents the word *ha*, "fish." This sign furnishes another example of the phonetic development of the Sumerian script. For the Sumerian word *ha* not only has the meaning "fish" but also "may"; that is, the Sumerians had two words *ha* which were identical in pronunciation but quite unrelated in meaning. And so, early in the development of the script the Sumerian scribes began to use the sign for *ha*, "fish," to represent the phonetically sounded *ha*, "may," just as in the case of the sign No. 11 they used the sign for *a*, "water," to represent the word *a*, "in."

No. 16 is a picture of the head and horns of an ox; it represents the word *gud*, "ox."

No. 17 is a picture of the head of a cow; it represents the word *ab*, "cow."

No. 18 is the picture of an ear of barley, it represents the word *she*, "barley."

The signs in the first column which we have examined in detail are from the earliest period in the development of Sumerian writing known to date. Not long after the invention of the pictographic script, however, the Sumerian scribes found it convenient to turn the tablet in such a way that the pictographs lay on their backs. As the writing developed, this practice became standard and the signs were regularly turned 90 degrees. The second column in our table gives the pictographic signs in this turned position. The third column represents the "archaic" script current about 2500 B. C. A century later, the signs looked like those represented in column IV, while columns V and VI show the signs current from about 2350 to 2000 B. C. The signs on our medical tablet approximate those used in the latter part of this period and hence its dating to about 2100 B. C. In column VII the signs resemble those current in the first third of the second millennium B. C., while the more simplified forms depicted on the last column were used by the royal scribes of Assyria in the first millennium B. C.

A STUDY OF IODIDES TINCTURE

By Wm. B. Swafford * and W. Lewis Nobles **

Rang (1) attributes to Dr. J. Y. Simpson of Edinburg the introduction of a decolorized tincture of iodine into medicine. This author reports that Hill, in 1887, attributed the introduction of such a preparation to Simpson "about 25 years ago", though no exact date or reference was given.

Tradition tells us that it was Simpson's idea to use this to replace the ordinary Tincture of Iodine as an antiseptic in obstetrical use to avoid the staining of bed clothes, as with ordinary iodine preparations. Apparently this preparation was used also for treating chilblains (1).

Simpson proposed the use of an alcoholic solution of ammonia for decolorization. Other pharmacists of that era apparently had an aversion to the use of this agent. Perhaps this was due to the slowness of the reaction—undoubtedly irritating the pharmacist when he had a call for the preparation which he did not have in stock. Different agents were suggested by others for the purpose of removing the color. Boulton, in 1867, proposed a combination of phenol and iodine(2). At about the same time Baruch suggested the use of sodium acid sulfite and sodium thiosulfate (3). These various formulations—and many similar subsequent ones—obviously were concerned only with decolorizing the tincture. Apparently, differences in the chemistry of the processes and products as well as therapeutic differences were overlooked or entirely neglected.

One might conclude that this confusion concerning the product would have markedly decreased interest in it as a medicinal agent. Contrariwise, it has persisted in medical practice to the present.

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Although a Scotch invention, Decolorized Tincture of Iodine was never official in the *British Pharmacopeia* (1). This type of preparation had been reported in the United States as early as 1863 (4), though not appearing in a standard compendium until the first edition of the *National Formulary* in 1888. Although the *U. S. Pharmacopeia* has never recognized this preparation, it has been included in each subsequent edition of the *National Formulary*. The composition of the preparation underwent a radical change in the fifth edition. Prior to this time sodium thiosulfate, as well as strong ammonia water, had been included in the official formula as a decolorizing agent. In the formula appearing in the fifth edition of the *National Formulary* the sodium thiosulfate was omitted and potassium iodide was included in the formula for the first time. The proportions of the various ingredients were markedly altered also. In addition, the title was changed from Decolorized Tincture of Iodine to Tincture of Iodides, to indicate that the iodine present was in the combined, rather than free, state. Ruddiman (5) pointed this out prior to the change as noted in the official compendium. "The title of this tincture is a misnomer, as it would lead one to think that free iodine is present. Iodine exists here only in combination. . . ."

The suggested contents of the finished preparation vary widely, according to different authors. If, as Kunz-Krause (6) points out, this preparation involves chemical reactions so complex that they may well fascinate the most profound pharmacist, the slip shod method in which the chemistry of this tincture has been brushed aside by so many writers is truly remarkable (1). In 1914 Pratt (7) reported the presence of ammonium iodide, ammonium iodate, acetaldehyde and iodoform together with an ammonia-nitrogen triiodide complex. Caspari and Kelly (8) report the conversion of iodine into ammonium iodide as a result of the action of the ammonia water. Concerning the formula previously used they reported that the finished product contained sodium iodide, sodium tetrathionate and ammonium iodide. Arny and Fischelis (9) state that the reaction between iodine and ammonia is quite complicated, the possible products being ammonium iodide, ammonium hypoiodite, ammonium iodate, nitrogen iodide, ammonium formate and even ethylamines. Lee (10) and Crossen and Goldner (11) indicate the expected course of the reaction by the following equation:

$$3I_2+6NH_4OH\rightarrow 5NH_4I+NH_4IO_3+3H_2O$$

Jackson and Rowe (12) have demonstrated that Iodides Tincture had a definite bacteriostatic action against *S. hemolyticus* on the skin of mice, although they report that several earlier workers (13, 14, 15) have suggested that this preparation possessed none of the therapeutic virtues of iodine. These investigators (12) observed that the bacteriostatic action of this preparation was greater than that which might be attributed to the alcohol present in the tincture.

As indicated previously, Pratt (7) had suggested that iodoform might be present in this preparation. Prior to this time, Darling (16) had observed a crystalline deposit in a preparation of this type prepared according to Curtman's formula (17). He stated that this was iodoform, basing his observation on the characteristic color and odor of this substance. Subsequent to this the report (18) was made that iodoform "is said by some to be formed. There can scarcely be any doubt in regard to the presence of the last named compound as its smell can be distinctly recognized in the decolorized tincture and crystals of it are occasionally found when the preparation is too weak in alcohol. It is probable that a great part of the efficacy of the tincture must be attributed to the iodoform it contains." Hill (19) pointed out that Darling (16) was the first to suggest the presence of iodoform. Later, Astolfi (20) mentions iodoform together with ammonium iodide as constituents of the tincture. Rang (1) prepared more than 40 samples of this type preparation using all 36 recorded formulas for the preparation. Iodoform did not crystallize in a single instance, though he reports the unmistakable odor of it in 2 of the preparations. Kunz-Krause (6), in a rather extensive report on this topic, does not mention the presence of iodoform. Guerin (21) attributed the formation of iodoform to the presence of carbon dioxide in an experiment which he conducted using iodine and ammonia water. Labat (22) later demonstrated that acetone-like bodies were present in the ammonia water. Thus, it would appear that ethyl alcohol might undergo the iodoform reaction in the presence of iodine and ammonia water. Rang (1) indicates that the presence of iodoform might well be accounted for by the two-fold action of iodine on ethyl alcohol, viz.

(1) The oxidation of ethyl alcohol

(a) $H_2O+I_2 \rightarrow 2HI+[O]$

(b) $CH_3CH_2OH+[O] \rightarrow CH_3CHO+H_2O$

(2) The substitution of the methyl hydrogens

$$CH_3CHO+6I \rightarrow CI_3CHO+3HI$$

(3) The hydrolysis of the triiodoacetaldehyde

$$CI_3CHO+NH_4OH \rightarrow CHI_3+HCOONH_4$$

Of particular significance in this connection is Pratt's claim (3) that acetaldehyde is present. In many ways the reaction may be regarded as being analogous to the well known reaction of iodine on ethyl alcohol in caustic alkaline solution.

It was our intention to study variations in the official formula of Iodides Tincture to determine, if possible, which of such changes could be correlated with the appearance of crystals of iodoform in the finished product. At this point it should be noted that over the past few years several of our students, in preparing Iodides Tincture, observed a yellow, crystalline precipitate which was identified as iodoform on the basis of a melting point of 118-119° and the fact that a mixed melting point determination made on this sample and an authentic sample of iodoform exhibited no depression.

Experimental and Results

The formula for Iodides Tincture N. F. is as follows:

Iodine	50	Gm.
Potassium Iodide	25	Gm.
Strong Ammonia Solution	100	cc.
Water	400	cc.
Alcohol, a sufficient quantity to make	1000	cc.

Nine variations in the official formula were utilized. Each of these involved the use of more or less of the prescribed quantities of the official constituents. The results of these variations are summarized in Table I. In each case 400 cc. of the tincture was prepared.

TABLE I

EXPERIMENTAL FORMULAS

Prep. No.	*Type Modification*	*Weight of Iodoform obtained* [a]
1.	Official Formula	None
2.	10% less Iodine	0.35 Gm.
3.	20% less Iodine	None [b]
4.	10% more Potassium Iodide	0.42 Gm.
5.	20% more Potassium Iodide	0.53 Gm.
6.	Substitute Diluted Alcohol U.S.P. for Alcohol U.S.P.	0.61 Gm. [c]
7.	20% less Ammonia Solution	1.41 Gm.
8.	Substitute 70% Alcohol for Alcohol U.S.P.	1.01 Gm.
9.	10% less Potassium Iodide	0.85 Gm.
10.	10% more Iodine	0.74 Gm.

It should be emphasized that no precipitate was observed when the official formula was rigidly followed. As indicated previously, a high percentage of student preparations had yielded iodoform even when the prescribed formula had apparently been followed. This may possibly be explained on the basis of greater difficulty in accurately weighing and measuring the correct quantities to prepare amounts appreciably smaller than the 400 cc. samples used in this study.

Summary and Conclusions

Nine variations in the official formula for Iodides Tincture have been prepared. Whereas the controls, prepared according to the N. F. formula, exhibited no precipitate of iodoform, eight of the nine altered formulas contained crystals of iodoform.

It thus appears that even minor variations in the official formula for this preparation will result in the deposition of crystals of iodoform.

(a) The weight as given indicates the total amount of precipitate obtained after further dilution of the finished product with distilled water.

(b) Samples of this preparation yielded no precipitate on standing, but 0.05 Gm. iodoform was obtained on diluting these samples with distilled water.

(c) This weight of iodoform was obtained without further dilution of this product. On dilution, samples of this formula yielded no more iodoform.

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A PHILADELPHIA "PHARMACEUTIST" IN THE OLD WEST—WILLIAM BARKER CHAPMAN (1813-1874)

By Glenn Sonnedecker *

YOUTHFUL William Barker Chapman landed in the old West, one of the professional sparks thrown off by the youthful Philadelphia College of Pharmacy. He symbolizes a small group of venturesome pharmacists, educated in early American schools or foreign homelands, who became foci for the spread of professionalism at cultural outposts about the middle of the 19th century.

In his native Philadelphia, a pharmaceutical center, Chapman might have become merely one among many able, ambitious "pharmaceutists." In Cincinnati, the burgeoning town on the Ohio River, he became prominent among a few leaders who sparked the early development of pharmacy there.

Educational Background

William Chapman grew up in the vicinity of Philadelphia. He was born June 5, 1813, probably at nearby Pennypack Hall (1). As an apothecary's apprentice he enrolled at the school of the Philadelphia College of Pharmacy, which had been founded only about a decade before (1821). There Chapman attended the lectures on materia medica and pharmacy by George B. Wood and those on chemistry given by Franklin Bache. Here were two outstanding teachers of the time, now best remembered for their work on the U. S. Pharmacopoeia and U. S. Dispensatory.

After attending these same lectures for a second time as required, completing the necessary apprenticeship, and writing an inaugural essay on ipecac, William Barker Chapman graduated in 1834 (*2*). Among his nine classmates was Augustine J. L. Duhamel, whose

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Adapted from a contribution to a symposium on the founders of the American Pharmaceutical Association at the 1952 meeting of the Association in Philadelphia.

prolific pen mediated a French influence on early scientific pharmacy in the United States (3).

Armed with the best pharmaceutical education then available on American soil—which only 36 Philadelphia and New York graduates had attained before him—Chapman promptly set out for Cincinnati (4).

Five years later he received there an M. D. degree from the Ohio Medical College (5), an institution long under attack from without and torn by dissension within. Although the College was not in the best condition by this time, Chapman probably got a reasonably good medical training if he took the standard two terms of lectures (6).

We do not know that Chapman ever had serious ambitions as a physician. Perhaps the Ohio Medical College only served conveniently to extend his education. In any case, when pharmacy and medicine were still imperfectly separated even in the cities, the twin degrees of Ph. G. and M. D. permitted him to meet every exigency in good conscience.

Professional Stature

William Chapman could be called a physician, but he was considered a pharmaceutist, by himself as well as by others.

Upon arriving in Cincinnati he had become "associated with Dr. Eberley in the drug business . . ." (7). By 1839, when he received his M. D., Chapman felt he was ready to set up his own home and his own shop. To accomplish the former, he wed Margaret, daughter of William Crossman. For the latter he chose the corner of 6th and Walnut Streets (8). Later he moved to the corner of Court and Vine but his last and best known shop was in the new Mechanics Institute building (9).

Chapman soon became known as a thorough pharmaceutist who went out of his way to manufacture his own preparations. He felt keenly his responsibility to train young apprentices for pharmacy in the West (10), at a time when good preceptors were almost as hard to obtain as a formal education.

When the North and South clashed, Chapman served in the U. S. Army at Camp Dennison, with the rank of Surgeon (11). After returning from war service Chapman constructed one of the first suppository molds made in a solid metal block. This eventually brought to him "the major part" of the suppository prescriptions of

Cincinnati. Before then it had been "customary in this city to make suppositories by twisting a small sheet of paper into a cone, waxing the edges, the top and bottom with sealing wax, and pouring therein the medicated cocoa butter" (12).

True to his cooperative bent, Chapman did not long try to reserve the advantage of the metal molds for himself. He also made molds for other pharmaceutists at $5, quite inexpensive in view of the work involved and their usefulness at the time. John Uri Lloyd, one of America's most distinguished and versatile pharmacists, says he bought a set "and used them subsequently for years in prescription work" (13).

Lloyd himself worked with Chapman at the pharmacy of the respected German apothecary, George Egers. Of this relationship Lloyd says: "It was my good fortune to be engaged in business as a clerk with Dr. Chapman, and I may say that these years of prescription work under his special direction were to me a source of invaluable knowledge . . . Dr. Chapman was one of the most thorough pharmacists it has ever been my opportunity to meet . . . The result of such instruction as came from Dr. Chapman to the young men of the Cincinnati College of Pharmacy is evidenced yet in the thoroughness of many matured pharmacists of the west, to whom in those early days he was a teaching preceptor" (14).

Can we then conclude that he was a success? No, he was a failure—by the commonplace monetary standard. John Uri Lloyd says: "He was not a successful business man, preferring rather the manipulative and educational side of his art than the business department of his store. He neglected the customer for manipulative work, and often cut a patron short in order to attend to some detail concerning manipulation, his theory being that the pharmacist should make everything he used, at least everything possible. The result was that while Dr. Chapman was thus engaged in making these preparations and attending to the scientific part of his art, he was losing the good will of his customers and finally their trade, the result being failure in a business way" (15).

The Cincinnati College of Pharmacy

We are hardly surprised to find Chapman among the five men who took the lead in establishing the Cincinnati College of Pharmacy in 1850. The founders may well have been stimulated "to greater effort in the accomplishment of their plans" (16) by the example and

spirit of the fledgling American Medical Association, which had met in Cincinnati earlier in 1850.

That same year Chapman was selected to represent the College at the Pharmacopoeial convention in Washington, the first time that Colleges of Pharmacy were officially invited to participate in revision work. As on later occasions Chapman had trouble reaching his destination, hence almost missing his place in history! As an anticlimax to the report on this significant meeting appears the statement: "After the adjournment of the Convention, Dr. William B. Chapman, one of the delegates from the Cincinnati College of Pharmacy, arriving in Washington, stated to the Secretary his concurrence in the proceedings of the Convention." (17) With this beginning, Chapman's role in U.S.P. work appears to have come to an end (18).

The Cincinnati College (i.e., association) did not establish a regular school of pharmacy until 1871. Sometime before that "personal and indirect" instruction was offered by several members. At the monthly roundtable discussions and at sessions in private homes, Chapman taught theoretical pharmacy (19). He was appointed professor of pharmacy in the formal school the year after it opened (1872) (20). Shortly before his death two years later Chapman was also named to the Cincinnati Board of Pharmacy (21).

Service to the A.Ph.A.

It was late afternoon on October 6, 1852, when the secretary droned off the roll of accredited delegates to the "National Pharmaceutical Convention," in the Hall of the Philadelphia College of Pharmacy. No one answered to the name of William Barker Chapman. Only Charles A. Smith spoke for the Cincinnati College of Pharmacy; and for all we know now, Chapman remained behind the counter of his shop as the American Pharmaceutical Association came into being. There can be no doubt that the spirit of William Chapman was with the little group of men gathered in Philadelphia for this historic event. Yet the remembrance of him as a "founder" hangs by a tenuous thread: that there were "satisfactory credentials" of his appointment as a delegate (22).

Chapman may not have been in Philadelphia for the founding, but he did make the even more arduous journey to Boston the next year for the Association's convention. There he was elected Cor-

responding Secretary, while Edward Parrish became Recording Secretary (23).

The Association year 1853-54 found Chapman also a member of the Special Committee on the Collection and Arrangement of the Statistics of Pharmacy in the United States. He was re-appointed for 1854-55. Illuminating information gathered by this Committee provided a framework for the influential "Address to the Pharmaceutists of the United States", prepared and published in 1854 under the guidance of William Procter, Jr. (24). We meet Chapman again in 1857 as an unobtrusive member of the Committee on Local Unofficial Formulae (25).

Chapman's participation in the youthful A.Ph.A. culminates with his election as president at the third annual meeting (1854). Does this accurately reflect Chapman's stature nationally? Probably not. First of all the meeting convened in his home town of Cincinnati. And precedent called for election of a president from the local ranks. Many pharmaceutists from Eastern cities could not come, the Secretary said, because of the prevalence of cholera (26). In fact, 16 of the 20 pharmacists attending were from southern Ohio (27). There may have been considerable last-minute recruitment around Cincinnati to bolster the convention, for the previous year Chapman and C. A. Smith had been the sole members in Ohio. With only these two Cincinnati signatures really dry on the register, the list of logical candidates for the presidency could not have been very long. Chapman's election undoubtedly reflects his preeminence among the city's professionally-minded pharmaceutists. One cannot say more.

When the A.Ph.A. again convened, the president's chair stood vacant. Perhaps the travel difficulties between Cincinnati and distant New York were more than Chapman counted on, for he arrived at the convention later (28).

His support and services were freely offered in these post-natal years of the Association but apparently he did not take a very vocal part in the proceedings. His pen likewise left few traces in the literature. The single article under his name in the *American Journal of Pharmacy* the editor reprinted (1854) from the *Transactions of the Ohio State Medical Society*. It discusses, for physicians, the importance and difficulty of obtaining pure pharmaceutical preparations and the proper formulation, choice and use of various types of medications (29).

Conclusion

William Chapman lived out his 61 years in a consistent pattern that expressed devotion to, and ambitions for, pharmacy. He is perhaps typical of a small group of American-educated pharmaceutists --smaller still than the group of educated immigrants—who went into the old west to become pioneers for a responsible profession of pharmacy distinct from medicine. An associative bent channeled his efforts into the development of a local organization and school and then into the larger sphere of action of the embryonic national organization (30). A rather quiet cooperation, instead of the stimulus of conflict, was this Quaker's way of contributing to American pharmacy's progress.

Chapman died on October 10, 1874, after a three-week bout with dysentery. He was the "oldest pharmaceutist in the city of Cincinnati" and one of the oldest members of the A.Ph.A. (31); significant but not great in American pharmacy of the 19th century; the kind of man John Uri Lloyd remembered as "a whole-souled, kind-hearted pharmacist, intent on doing well that which he had to do; wrapped up . . . to the extreme in his art." (32)

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earliest in Cincinnati but perhaps in the country. Beringer pointed out, however, that plaster of paris molds for suppositories were used as early as 1840 in the Heinitsh store at Lancaster, Penna. (Ibid., p. 502). Cf., George B. Griffenhagen, "The History and Evolution of the Suppository Mold," *Amer. J. Pharm., 125:*136 (1953).

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(14) John Uri Lloyd, "The Chapman Suppository Mold," *Proc. Amer. Pharm. Assoc., 50:*501f. (1902) and personal communication from Corinne Miller Simons of the Lloyd Library and Museum, Cincinnati, July 2, 1952. According to unpublished papers in the Lloyd Library, Chapman was the senior clerk at the time Lloyd was a junior clerk for Eger, sometime after 1863.

(15) *Ibid.*, p. 502. It may be that Chapman's employment in the George Eger pharmacy was due to failure of his own establishment, although I have no evidence on this point.

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(22) Proceedings of the National Pharmaceutical Convention, held at Philadelphia, October 6th, 1852, 2nd ed. unaltered, Philadelphia, 1865.

(23) Chapman himself served on the Nominating Committee, which suggests the idea that he quite willingly accepted, if not even welcomed, this office.

(24) Proc. Amer. Pharm. Assoc., 1853, 1854.

(25) Proc. Amer. Pharm. Assoc., 1857, p. 174.

(26) Proc. Amer. Pharm. Assoc., 1854, p. 4.

(27) Proc. Amer. Pharm. Assoc., 1854, p. 4. C. A. Smith was mentioned as from Kentucky, perhaps to give a more representative flavor to the roll call; I have counted him among the Ohioans since he was always thus identified on the membership roster.

(28) Proc. Amer. Pharm. Assoc., 1855, pp. 3 and 8.

(29) William B. Chapman, "On the Uncertainty of the Composition of Pharmaceutical Preparations, and the Most Eligible Form of Medicines for Administration", *Amer. J. Pharm., 26:*154-159 (1854).

(30) Chapman's service "for many years" as Grand Master of Odd Fellows of the State of Ohio tends to confirm that he had a personal inclination toward association activity. ("Obituary", *Amer. J. Pharm., 46:*544 (1874).

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SELECTED ABSTRACTS

The Insufflation of Vitamin B_{12} for the Treatment of Pernicious Anemia. Israels, M. C. G., and Shubert, S. *The Lancet 266:*341 (1954). In seeking for a means for the administration of vitamin B_{12} other than by intramuscular injection, the oral administration in combination with intrinsic factor from gastric or duodenal mucosa is being investigated. However, the authors stated that the latter had not proven to be too successful in their experience and the tablets were costly. They, therefore, investigated the possibility of absorption by means of insufflation.

Five patients were given insufflations of 100 ug. of vitamin B_{12} in 0.135 Gm. of a non-irritant powder. Perforated capsules were prepared so that threads could be removed from the perforations when they were inserted into the insufflator. The patient was instructed to inhale deeply when the powder was ejected into the nostrils. Initially larger doses than those given intramuscularly were employed, but it soon became apparent that doses of the same order were equally effective in improving the blood picture. The therapeutic dosage given varied from 100 ug. to 300 ug. a day. The maintenance dosage was 100 ug. once or twice a week.

The authors, therefore, suggested that insufflation is a useful alternative to intramuscular administration of vitamin B_{12}. No untoward effects were noted, but this mode of administration would not be satisfactory in patients with nasal obstruction or chronic catarrh. Otherwise, it is a safe, effective and relatively economical method for the self-administration of this vitamin.

The Dangers of Polypharmaceutical Preparations Containing Folic Acid. Lowther, C. P. *Brit. Med. J.* No. 4861:564 (1954). A case was described by the author in which a proprietary preparation containing iron and folic acid (3 mg. a day) was given to a patient with an anemia which had not been accurately diagnosed. There was a prompt improvement in the blood picture of the patient but this was accompanied by a rapid development of combined degeneration of the cord with paraplegia. When treatment was begun

with vitamin B_{12}, there was a rapid hematological and neurological improvement. Even apart from other findings, a rapid neurological response is strong support for a diagnosis of Addisonian anemia.

The author summarized the arguments against the inclusion of folic acid in polyvitamin preparations as follows. Folic acid temporarily improves the blood picture. The physician then is faced with a disease of the central nervous system which may be misdiagnosed since anemia almost always accompanies subacute degeneration of the cord. The relief of the general symptoms of pernicious anemia may give false reassurance which will mask the symptoms of deterioration of the nervous system. Folic acid deficiency was felt to occur very infrequently and thus is not needed in multivitamin preparations. Finally, the author pointed out that the question of whether or not folic acid actually precipitates cord degeneration is still uncertain.

The Use of Vitamin B_{12} in the Treatment of Trigeminal Neuralgia. Surtees, S. J., and Hughes, R. R. *The Lancet 266:* 439 (1954). Although not very common, trigeminal neuralgia is very distressing when it does occur. In an effort to reduce the pain, eighteen patients with trigeminal neuralgia and one with glossopharyngeal neuralgia were treated with massive doses of vitamin B_{12} Considerable symptomatic improvement occurred in 15 of these patients following treatment.

The dosage of the vitamin employed varied considerably. A total of 5000 ug. to as much as 43,000 ug. were given intramuscularly. Following their experiences with these patients the authors concluded that the more likely dosage regimen should consist of 1000 ug. daily for 10 days followed by five injections of 1000 ug. twice a week. It is also possible that maintenance therapy will be required in some patients.

In most of those patients in whom improvement took place, it occurred quite suddenly, usually after the second or third injection. The period of remission appeared to be quite long in some patients without further treatment. The one case of glossopharyngeal neuralgia responded well to treatment.

The authors raised the question as to whether or not vitamin B_{12} has a specific effect in trigeminal neuralgia or whether similar results might be produced in other types of painful conditions. As yet there is little evidence relative to these questions.

Sulfaguanidine as a Potential Therapeutic Agent in Urology. Ingalls, J. W., Jr. *Science 119:*191 (1954). Sulfaguanidine has been used for some time for its chemotherapeutic effect on the intestinal flora. It has generally been conceded that this sulfonamide was slowly and/or poorly absorbed from the gastrointestinal tract. Studies on the absorption and excretion of sulfaguanidine by the author have shown that the drug is often rapidly and well absorbed.

In 90 per cent of the experiments performed with 40 normal healthy young men students, it was found that higher titers of sulfaguanidine were obtained in the urine more rapidly than for sulfadiazine. In five other persons the excretion of the drug was investigated further. Following the administration of a single dose the amount of drug passed in the urine varied from a low of 17.3 per cent of the dose, recovered as free drug, to a high of 84.3 per cent recovered as total drug (free sulfaguanidine and acetylsulfaguanidine). In the latter case 79 per cent of this excreted drug was in the free form and 21 per cent in the acetylated form.

In renal clearance studies it was found that the kidney could remove sulfaguanidine more effectively than it removes urea from the blood. As was expected, during all of these studies the blood level of sulfaguanidine was quite low, usually below 1 mg. per cent.

The author suggested that the therapeutic potential of this drug should be reevaluated. He referred to another investigation in which it was found that concentrations of 10 mg. per cent of sulfaguanidine and of urea were synergistic against *E. coli.* Since the excretion of urea amounts to about 1000 mg. per cent in the normal adult, there would be ample present for a synergistic effect with sulfaguanidine.

Skin Infections Treated With Oxytetracycline-Polymyxin B Ointment. Appel, Bernard. *Antibiotics & Chemother. 3:*1258 (1953). An ointment containing 3 per cent oxytetracycline hydrochloride and 0.1 per cent polymyxin sulfate B was used in the treatment of skin infections in a large number of patients. Two hundred of these cases were summarized by the author. The patients ranged in age from infants to elderly persons. Among all of these patients there was not one case of irritation or sensitization encountered.

The ointment was used by application to the affected areas three times a day. In cases where there was excessive encrustation, the

crusts were removed by washing with a soapless detergent. No other type of treatment was used.

The effectiveness of this treatment was striking in the pyogenic dermatoses and in skin conditions associated with pyogenic bacteria. Twenty-one cases of impetigo, 18 cases of folliculitis, 54 cases of impetiginized dermatoses including 10 cases of neurodermatitis, 20 cases of dermatitis venenata, 8 cases of seborrheic dermatitis, 4 cases of hypostatic dermatitis (varicose eczema) and varicose ulcer, and 12 miscellaneous dermatoses all responded well. In the cases of impetiginized dermatoses, the superinfection responded to the treatment but the underlying dermatoses did not usually show any effect. The superinfection was controlled rapidly without irritating the underlying condition. Five cases of otitis externa (infectious eczematoid dermatitis) and 5 cases of acne necrotica miliaris of the scalp (with a duration of 5 months to 3 years) also cleared promptly.

The ointment was also used in 56 cases of minor surgical procedures such as biopsy wounds and after electrosurgical removal of skin growths as an anti-infective dressing. There was no evidence of infection in any of the cases and no evidences of sensitivity to the medication. The ointment was ineffective in 2 cases of pyogenic granuloma, in 6 cases of pustular psoriasis, and in a few other single-case conditions.

Studies with Tetracycline. Putnam, L. E., Hendricks, F. D., and Welch, H. *Antibiotics & Chemother. 3:*1183 (1953). The new antibiotic tetracycline has a bacterial spectrum similar to that of chlortetracycline or oxytetracycline, but it has been found to be more soluble than chlortetracycline and more stable under the usual test conditions than either of them.

Following oral administration of 0.5 Gm. of tetracycline every six hours for four doses the blood levels were found to be comparable to those obtained with the same doses of chlortetracycline. Similar results were obtained following single oral doses of 1 Gm. and 2 Gm. of both antibiotics. Whether the tetracycline was produced by catalytic hydrogenation or by fermentation the blood concentrations were comparable.

A phenomenon was noted which could not be explained. Tablets given to 111 adult healthy males produced a higher incidence of side

reactions than did capsules from the same lot of antibiotic given to 106 adult healthy males. The dosage employed was 2 Gm. a day for 3 days. The over-all incidence of nausea, vomiting and diarrhea was only 5.5 per cent, but with each of these symptoms the incidence was slightly higher among those taking the tablets than among those taking the capsules. Four of the 217 subjects exhibited skin reactions which may have been of an allergic nature.

A group of 32 patients with respiratory, urinary tract, intestinal, and miscellaneous infections were treated with tetracycline. Of these, 22 received 1 Gm. a day and 10 received 2 Gm. in divided doses. The clinical response was comparable to that which would have been expected from chlortetracycline or oxytetracycline. None of the patients was required to discontinue the drug because of vomiting or diarrhea although a few did complain of heartburn, belching, and flatulence.

The Withdrawal Effects of Cortisone Following Therapy for Rheumatic Fever. Daniels, R. S., Gulotta, G. A., and Peterson, W. L., *U. S .A. F. Med. J. 5*:176 (1954). The withdrawal effects of cortisone have not been presented to any extent in the literature, according to the authors. They found that 10 of 12 young men from 17 to 21 years of age who were treated with cortisone for rheumatic fever showed withdrawal symptoms of varying degree. The patients were all given a course of a total of 3.1625 Gm. of cortisone over a period of 28 days. The initial dose was 300 mg. a day, intramuscularly. This was gradually decreased until only 12.5 mg. were given on the last day.

The withdrawal effects followed no particular pattern. In some they developed as much as nine days before therapy was discontinued and in others as much as seven days after. The most frequent symptom was that of fever, which occurred in eight of the ten patients. Other symptoms in the order of frequency were, elevated sedimentation rate in four, polyarthritis in four, abnormal electrocardiographic findings in two, development of diastolic murmurs in two, and tachycardia in one. The withdrawal effects usually subsided in from one to nineteen days.

Seven additional patients were given large doses of salicylates, a total of 163.2 Gm. over 28 days. The withdrawal effects in these

patients were essentially the same as in those patients who received cortisone.

Patients with severe rheumatic carditis and those with previous rheumatic fever appeared to have the most severe reactions. This is of the most serious consequence because these patients have the least tolerance to endure the strain of the withdrawal effects. The authors felt that too little attention has been paid in the past to this phenomenon.

Aureomycin in Aqueous Ointment Bases. Carr, T., Pradham, M. K., and Grainger, H. S., *Pharm. J. 171*:421 (1953). The stability of aureomycin hydrochloride in aqueous ointment bases was studied. A preliminary test showed that aureomycin was rapidly destroyed in a base with an alkaline pH. The most stable pH was 3 but this was considered too acid for general use. Three different ointment bases were then prepared having a pH of 6.6, 7.0 and 6.0. The bases themselves were found to have no bacteriostatic or bactericidal effect on *Sarcina lutea,* the test organism used in the cup-plate assay method.

When stored at refrigerator temperatures (3° C.) full potency was maintained for 20 days in all three bases. Full potency was also maintained for 15 days when the bases were stored at room temperature. One of the bases was slightly superior to the others. This base had a pH of 6.0 and retained 85 per cent of its original potency after 35 days at room temperature and after 50 days at refrigerator temperature. The concentration of aureomycin used in each case was one per cent by weight.

The base providing the greatest stability had the following formula:

Polawax (a preparation of cetostearyl alcohol with a polyoxyethylene derivative of a sorbitan fatty acid ester)	8 Gm.
Propylene Glycol	18 Gm.
Liquid Petrolatum	40 Gm.
Paraffin	4 Gm.
Distilled Water	30 cc.

Local Administration of Hydrocortisone in Rheumatic Diseases. Brown, E. M., Jr., Frain, J. B., Udell, L., and Hollander, J. L., *Am. J. Med. 15*:656 (1953). A group of 547 patients with various types of rheumatic diseases were given a total of 3,757 injections of hydrocortisone into inflamed joints or other non-infected locally diseased tissues. Of this group, 249 patients had rheumatoid arthritis and 210 had osteoarthritis (other than of the hip). The dosage varied from 5 to 25 mg. depending on the size of the joint. If no response was obtained with the initial dose it was increased but never was a dose larger than 50 mg. injected into one joint at one time. About 85 per cent of the cases were classified as a success, that is, each of a series of injections gave significant palliation for a period of time sufficient to be of practical value, throughout the period of study.

The authors concluded that there are certain areas of usefulness for local therapy with hydrocortisone. These are: (1) suppression of acute or chronic inflammation of one or a few peripheral joints (infection absent), (2) suppression of non-specific inflammation of bursae and tendon sheaths, (3) suppression of local disease in a few more actively involved joints while slower systemic therapy gains effect or where systemic therapy is contraindicated, (4) therapeutic control of more resistant joints permitting maintenance on lower systemic therapy or with greater effectiveness, (5) suppression of inflammation in joints permitting more effective physiotherapy or in preparation for or following orthopedic or surgical measures. Such therapy is contraindicated in the presence of infection or of proven hypersensitivity to either hydrocortisone or the vehicle. Little benefit is to be expected and dangers may be inherent in local treatment of diseased spinal joints, joints without synovial space, multiple joints with generalized active involvement. It is also usually useless to attempt further therapy after several trials with therapeutic failure.

BOOK REVIEWS

Quantitative Organic Analysis via Functional Groups. Second Edition. By Sidney Siggia, Ph.D., Research Analyst, Central Research Laboratory, General Aniline and Film Corporation, Easton, Pa. John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y., 1954. x + 227 pp. 30 figs. 15x22 cm. Price $5.00.

The second edition of this well known book has been issued to bring the first edition up to date. The original purpose of the text, to be useful to the laboratory analyst without need for searching the literature, is still maintained. A few changes have been made in some of the procedures which were found to increase the accuracy and precision of the methods.

Two new sections are included: one on some of the techniques and reasoning in developing new analytical methods or modifying existing methods. The other on the use of quantitative functional group analysis in the identification of organic compounds. As before, each method indicated is amply covered by general references to the method. Furthermore sample calculations and a list of compounds known to have been tested by the indicated methods are given at the end of each procedure. The literature appears to be covered up to 1953.

The methods outlined are clear, concise and easily reproduced. This book should be invaluable to anyone in organic research or control work.

A. R. GENNARO

Pharmaceutical Preparations. By George E. Crossen and Karl J. Goldner. Third, thoroughly revised edition. Publishers: Lea & Febiger, Philadelphia, 1952. 265 pp. $4.00.

The revised text of this well-known book has been brought into complete accord with the U. S. P. XIV and N. F. IX. The classification of the preparations is based on (1) the physical characteristics of the preparation; (2) the method of preparation; (3) the concentration of the preparation; e.g., tinctures and fluidextracts; and (4)

the use for which it is intended. It follows the general pattern of discussing the preparations by these classes and, thus, is an aid for the pharmacy student who has some basic scientific knowledge and is now studying the official preparations of the U. S. P. and N. F. The four appendices discuss: Extraction, the Harrison Narcotic Act, "Dangerous Drugs," and Sterilization respectively.

The student must supplement the information contained in this book with lecture notes in order to obtain a thorough knowledge of the "Pharmaceutical Preparations."

ELSA EHRENSTEIN

The Art of Communicating Ideas. By William J. Grace and Joan Carroll Grace. The Devin-Adair Company. New York. 1952.

Man must know many things if he is to survive. Knowing and using are not enough for the scientist today; modern technology is built on cooperation. This cooperation is obtained through communication of ideas. This "telling" is facilitated by the many useful ideas promulgated in this intensely interesting text. The authors feel that, in their own words: "Trained minds have the responsibility not only to make their own thoughts clear but to restore meaning to language for the common good of Society." They have succeeded admirably in their efforts.

Designed as a textbook for College English classes, this book is useful to all writers. Throughout, emphasis is placed on thinking as well as writing. Concrete suggestions and examples are given. The writers practice what they preach. Of particular interest to this reviewer was the section on "Propaganda Devices: The War of Ideas."

This is an ingenious and ingenuous book which lays the secrets of communication bare. Here under a single cover may be found the answers to ninety-five percent of the problems faced by the expert and novice alike. Ideas are traced from conception to execution, and the reader is aided, in a practical way, to get himself down on paper in a clear, concise, dignified prose.

CHARLES E. WELCH, JR.

The Dynamics of Virus and Rickettsial Infections (International Symposium). Edited by Frank W. Hartman, Frank L. Horsfall, Jr., and John G. Kidd. The Blakiston Company, Inc., New York, 1954. 461 pp.

This book contains the papers read at the International Symposium on the Dynamics of Virus and Rickettsial Infections held in Detroit, 1953, at the Henry Ford Hospital. Most papers deal with animal viruses, but plant viruses and bacterial phages are also considered. This book is not only interesting for virologists, but it also contains valuable information for people interested in the health sciences. The majority of papers make good reading even for those not working in the specific field covered.

Studies of the viruses revealed a great number of entirely new biologic phenomena and directed attention to problems of biology which were not considered before the recent concepts became known. Most people trained in the biological sciences feel that virology is the major gap in their knowledge of general biologic phenomena. This is probably so because the bulk of the developments in the field of virology occurred within the past few years. In the opinion of the reviewer, this book will be a valuable aid in bridging this gap and will be a valuable guide for further readings.

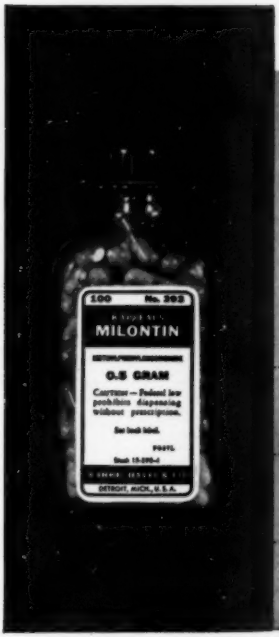
The book contains the following chapters:

1. A. Gottschalk, "The Initiation of Cellular Infection by Viruses".
2. A. D. Hershey, "Some Central Problems of Viral Growth".
3. T. T. Puck, "Cell Attachment and Penetration by Viruses".
4. S. E. Luria, "Genetic Functions and Development Processes of Bacterial Viruses".
5. P. von Magnus, "'Incomplete' Forms of Influenza Virus".
6. G. K. Hirst, "Studies on Double Infection with Influenza Virus".
7. F. C. Bawden, "Cellular Metabolism and Virus Growth".
8. B. Commoner, "Plant Viruses and Proteins".
9. M. H. Adams, "Abortive Infection with Viruses".
10. S. S. Cohen, "Metabolic Transformations in Virus Infected Cells".
11. W. W. Ackermann, "Intracellular Sites Important to the Development of Animal Viruses".
12. E. A. Evans, Jr., "Enzymic Changes in Virus Synthesis".
13. R. E. Shope, "Ecology and Virus Reservoirs".

14. J. R. Audy, "The Effect of Host and Vector Densities on the Epidemiology of Scrub Typhus".
15. L. O. Kunkel, "Maintenance of Yellows-type Viruses in Plant and Insect Reservoirs".
16. W. H. Price, "Variation in Virulence of 'Rickettsia rickettsii' under Natural and Experimental Conditions".
17. W. McD. Hammon, "Pathogenic Mechanisms of Virus Diseases".
18. A. W. Downie and K. McCarthy, "Pathogenesis of Variola".
19. J. E. Salk, "Mechanisms of Convalescent Immunity and How It May Be Simulated".
20. D. Bodian, "Sites of Immune Barriers in Poliomyelitis".
21. K. Habel, "Mechanism of Active Induced Immunity with Attenuated Living Vaccines".
22. H. Koprowski, "Practical Application of Living Virus Vaccines".
23. K. F. Meyer, "Early Diagnosis of Infections by the Psittacosis-Lymphogranuloma Venereum Group".
24. F. O. MacCallum, "Early Diagnosis of Smallpox".
25. T. H. Weller, "The Diagnosis of Virus Infections Employing Tissue Culture Methods".
26. E. H. Lennette, "An Evaluation of Diagnostic Procedures for Virus and Rickettsial Diseases".
27. J. C. Snyder, "Early Detection of Antigen as a Diagnostic Method".
28. F. L. Horsfall, Jr., "Interference and Physical-Chemical Blockade".
29. R. D. Hotchkiss, "Bacterial Transformation as an Infection by Desoxyribonucleic Acid".
30. A. F. Rasmussen, Jr., "Nutritional Inhibitors".
31. D. W. Woolley, "Inhibition of Virus Multiplication through Considered Use of Antimetabolites".
32. I. W. McLean, Jr., F. A. Miller, and W. A. Rightsel, "Suppression of Growth by Clinical Antibiotics".
33. T. E. Woodward and R. T. Parker, "Clinical Application and Mode of Action of Antibiotics in Rickettsial and Virus Diseases".

Text of discussion of each chapter is also included.

JULIAN L. AMBRUS



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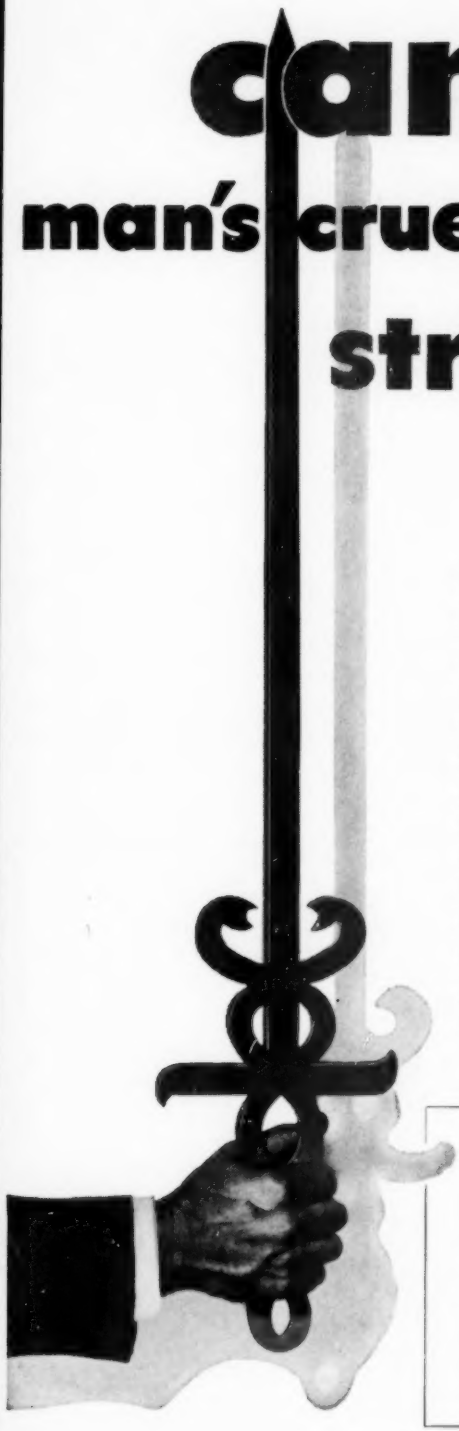

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